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54 MECHANICAL HANDLING APPARATUS.

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73 Proprietor: **HYDRAROLL LIMITED**
No.2 Factory, Industrial Estate Gaerwen
Anglesey Gwynedd LL60 6HR (GB)

72 Inventor: **COOK, Kenneth**
Greystones Tros-yr-Afon Llangoed
Beaumaris Anglesey Gwynedd (GB)

74 Representative: **Johnson, Terence Leslie et al**
Edward Evans & Co. Chancery House 53-64
Chancery Lane
London WC2A 1SD (GB)

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Description

The invention relates to mechanical handling apparatus.

BACKGROUND ART

Conveyors such as roller tracks which can be raised above or lowered below a floor or other substratum are often mounted in positions which are relatively inaccessible, for example in a 40 foot (1 foot = 30.48 cm) container vehicle. It is often difficult to manhandle a load along the full length of the track in such circumstances.

EP—A—0 002 106 discloses an elongate conveyor in which rotatable means are supported by inflatable means over which a driven belt is trained and which is raised into, and lowered from, contact with a load on the conveyor when the inflatable means is inflated and deflated. If a load stops on the conveyor for any reason, the belt becomes jammed and drive means therefor can be damaged.

It is an object of the invention to seek to mitigate this disadvantage or prior apparatus.

According to the invention there is provided mechanical handling apparatus, comprising an elongate conveyor in which freely rotatable means are supported by inflatable means so that when such means is inflated part of the rotatable means stands above a support surface and renders any load thereon mobile whereas when the means is deflated the rotatable means is retracted so that the load is immobile on the support surface, drive means for engaging a load and moving same along the conveyor when part of the rotatable means protrudes above the support surface, power means to drive the drive means, and a device mounting the drive means for raising and lowering same with respect to the support surface, characterised in that the drive means is mounted along the length of the elongate conveyor, and in that the drive means has a surface which can 'slip' in contact with an immovable load whereby the power means continues to actuate the drive means. Mechanical handling apparatus embodying the invention is hereinafter described, by way of example, with reference to the accompanying drawings.

Figure 1 is a schematic circuit arrangement showing part of mechanical handling apparatus embodying the invention;

Figure 2 is a plan view of the mechanical handling apparatus of Figure 1; and

Figure 3 is an enlarged cross-sectional view on the line 3—3 of Figure 2.

Referring to the drawings, the mechanical handling apparatus 1 shown has a hollow elongate body member 2 in the form of a channel member 3 which houses an inflatable device in the form of an air bag assembly 4 which has connectors (not shown) for connecting it to an existing air supply of a vehicle for example. The mechanical handling apparatus 1 thus forms a track.

The open top of the channel member 3 is closed

by a static support surface in the form of a top plate 5 (as viewed in Figure 3) which has a number of discrete openings 6. A roller 7 is aligned, in the vertical sense, with each opening 6. The rollers 7 are freely rotatable and are mounted by means 8 such as a shaft and retainer nuts in a mounting in the form of a channel shaped support 9 the underside of which is in contact with the air bag assembly 4.

The clearance of the rollers 7 and their associated openings 6 is such that substantially no foreign bodies can enter the channel member. Under the support 9 and above the air bag 4 there is a flat plate (not shown) covering the width of the inside of the body member 2 to protect the air bag from foreign bodies which might possibly enter into the inside section.

The apparatus 1 has stop means in the form of a plate 10 intermediate its length and independent of the air bag assembly 4. The stop plate 10 comprises a flat plate which can be moved manually from one position to another position in which it is supported in a slot 11 in the body member 2. There is a slot 11 at either side of the device, see Figure 2.

There is a stop plate 12 at each end of the body member 2.

The stop plate 10 is between two rollers 7 so that in the inoperative position shown in Figure 2, one edge lies close to one of the rollers.

There is a longitudinally extending guide plate 13 (Figure 2) secured to one side of the apparatus 1 (though this guide plate can, it will be understood, be dispensed with).

The apparatus 1 also includes a separate drive means in the form of a driven roller 14. There is in the embodiment shown a driven roller at the end of each conveyor section or elongate body member 2, in other words there is a driven roller 14 between adjacent elongate members 2, 2' and 2'' as shown in Figure 2. A complete conveyor track then comprises a plurality of members 2, 2', 2'' laid end to end with a driven roller 14 between the members. The spacing of the driven rollers 14 is selected to match pallet lengths, it will be understood. There is also a driven roller 14 at the ends (not shown) of the track. Each driven roller 14 is pivotably mounted by a device comprising a pivoted mounting or bracket 15 which allows the driven roller 14 to be raised and lowered with respect to top plate 5. This transverse movement with respect to the top plate 5 is effected by coupling the pivoted bracket 15 by a fluid operated device in the form of an air ram 16 (with control valve 17) for controlling this movement. The driven roller 14 is driven to drive a load in the form of for example a pallet 18 over the apparatus 1 by power means in the form of a transmission chain 19, hydraulic motor 20, control valve 21 motor/pump 22 with filter 23 and relief valve 24 and a battery 25.

The track is installed in situations where loads are to be handled, for example in a container trailer, ship or aircraft hold. The tracks 1 are generally laid in parallel in pairs along the length

of say a vehicle at lateral spacings adequate to support a load-carrying pallet 18. The air bag assemblies 4 and the air ram 16 are connected to a suitable respective pneumatic source, which could be the air supply system of the vehicle (not shown).

In order to move a pallet 18 into the vehicle, the air bag 4 is inflated so that the rollers 7 protrude above the plane of the top plate 5, which is substantially flush with the floor of the vehicle which forms the support surface for the pallet 18. The air control ram 16 is also activated to pivot the bracket 15 and raise the driven roller 14 above the support surface too. The motor 20 is actuated to rotate the rollers 14 and so drive a pallet 18 along the track, the spacing between the rollers 14, one pallet length, being such as to ensure that the pallet 18 is continuously fed along the tracks 1.

When the pallet 18 is in the desired position, the roller 14 rotation is ceased, the bracket 15 is pivoted downwardly (as considered in Figure 1) and the air bags 4 are deflated so that the "live" tracks become "dead". The stop plates 12 can be flipped up manually, out of the plane of the top plate 5, to help keep a pallet in position.

In order to unload the vehicle, the stop plates 12 are returned to the horizontal position, the air bags 4 are inflated to raise the pallet off the support surface, and the pivotable bracket 15 is raised in order to raise the driven roller(s) 14 so that it (they) too can engage the pallet 18. The motor 20 is then operated in the reverse mode to rotate the roller(s) 14 in the opposite sense to that for loading, and the pallet 18 is driven along the tracks 1 to the exit from the vehicle, where it can be received by another conveyor system such as the kind often used at airports, or by a fork-lift truck. The provision of the drive roller(s) 14 on a pivotable bracket 15 ensures that the roller(s) 14 can freewheel as the roller or rollers is are not in contact with a pallet and also the freewheel provision in the embodiment shown avoids the difficulty in matching the speed of the roller(s) 14 to the speed of an external conveyor. This is achieved in that the surface of the roller(s) moves in an arc when it is raised and lowered. Also, the lowering of the roller(s) 14 ensures that the usual operation of the rollers 7 on raising and lowering of the air bags 4 can be achieved. Further, an adequate drive of the pallet 18 is achieved with limitation of the driven roller thrust vertically and this avoids damage to a pallet and the requirement for excessively strong mountings for the bracket 15 and excessively powerful power means for driving the rollers(s) 14.

It will be understood that the mechanical handling apparatus 1 above described and shown in the drawings can be modified. For example, the stop plates 10 although shown can, and usually will, be dispensed with entirely. Also, the driven rollers 14 can be placed between parallel tracks 1 or alongside a track 1 rather than along the length thereof. Alternatively, a driven roller 14 can be incorporated in the elongate body channel

member 2. The power means shown is an electro-hydraulic drive, but this could be replaced by a geared electric motor. The air ram 16 for controlling raising and lowering of the roller 14 can be replaced by an inflatable air bag or an hydraulic ram. The driven roller 14 can also be directly driven by the hydraulic motor instead of through the transmission chain 19, which is then dispensed with. The air control ram or bag could also be driven from the same source as that for the air bags 4 by suitable modification. Also, where several rollers 14 are used, they could all be driven by a single power means and selected ones could also be raised and lowered by a common air ram, air bag or hydraulic ram.

It will also be understood that the expression drive means used herein refers to both a roller as shown and described, and a rotatable device such as a chain, strand or belt which is endless and is trained round two or more rotatable members such as rollers, sprockets, wheels, pulleys or the like one or more of which is driven and with which the chain or, strand or belt moves. In every embodiment, the roller(s) 14 or endless chain, strand or belt can "slip" under a load such as a pallet once that pallet is stopped from further movement by abutment against a stop such as a stop plate 10 or another pallet. The motor 20 can thus continue to drive the drive means for the load such as a pallet until the container vehicle is filled to the required amount. This saves on turn round time and loading/unloading time.

The top plate 5 may it will be understood be flat rather than of channel section as shown, though the illustrated channel section 5 is preferred as it is stronger. In either case the plate 5 is readily removable for replacement or maintenance while the track is still mounted on a vehicle or other floor.

Claims

1. Mechanical handling apparatus, comprising an elongate conveyor (2) in which freely rotatable means (7) are supported by inflatable means (4) so that when such means is inflated part of the rotatable means stands above a support surface (5) and renders any load thereon mobile whereas when the means (4) is deflated the rotatable means (4) is retracted so that the load is immobile on the support surface, drive means (14) for engaging a load and moving same along the conveyor (2) when part of the rotatable means (4) protrudes above the support surface (5), power means (19, 20) to drive the drive means, and a device mounting the drive means for raising and lowering same with respect to the support surface, characterised in that the drive means (19) is mounted along the length of the elongate conveyor (2, 2', 2''), and in that the drive means (14) has a surface which can 'slip' in contact with an immovable load whereby the power means (19, 20) continues to actuate the drive means (14).

2. Mechanical handling apparatus according to claim 1, characterised in that there is a pivoted

mounting bracket (15) coupled to a fluid-operated actuator (16, 17) and to the drive means (14) for raising and lowering the drive means (14).

3. Mechanical handling apparatus according to either preceding claim, characterised by a transmission member (19) and hydraulic motor (20) comprising the power means to drive the driving means (14).

Patentansprüche

1. Mechanische Handhabungs- bzw. Transportvorrichtung, umfassend einen langgestreckten Förderer (2), in welchem frei drehbare Einrichtungen (7) auf aufblasbaren Einrichtungen (4) abgestützt sind, sodaß, wenn diese Einrichtungen aufgeblasen werden, ein Teil der drehbaren Einrichtungen über einer Abstützfläche (5) steht und jede darauf befindliche Last bewegbar macht, während, wenn die Einrichtung (4) nicht aufgeblasen ist, die drehbare Einrichtung (4) eingezogen wird, sodaß die Last auf der Abstützfläche unbewegbar ist, eine Antriebseinrichtung (14) zum Angreifen an einer Last und Bewegen derselben entlang des Förderers (2), wenn ein Teil der drehbaren Einrichtung (4) über die Abstützfläche (5) hinausragt, eine Energieeinrichtung (19, 20) zum Antrieb der Antriebseinrichtung, und eine Montage- bzw. Aufbauvorrichtung für die Antriebseinrichtung zum Heben und Senken derselben in bezug auf die Abstützfläche, dadurch gekennzeichnet, daß die Antriebseinrichtung (14) entlang der Länge des langgestreckten Förderers (2, 2', 2'') angeordnet ist und daß die Antriebseinrichtung (14) eine Oberfläche besitzt, die in Berührung mit einer unbewegbaren Last "gleiten" kann, wodurch die Energieeinrichtung (19, 20) weiterhin die Antriebseinrichtung (14) betätigt.

2. Mechanische Handhabungsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß ein schwenkbarer Montageträger bzw. -arm (15) mit einer durch Fluid betätigbaren Betätigungseinrichtung (16, 17) und mit der Antriebseinrichtung (14) zum Heben und Senken der Antriebseinrichtung (14) gekoppelt ist.

3. Mechanische Handhabungsvorrichtung nach

einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Energieeinrichtung zum Antrieb der Antriebseinrichtung (14) ein Übertragungs- bzw. Getriebeelement (19) und einen hydraulischen Motor (20) umfaßt.

Revendications

1. Appareil de manipulation mécanique, comprenant un convoyeur allongé (2) dans lequel des moyens à rotation libre (7) sont portés par des moyens gonflables (4) de manière que, lorsque de tels moyens sont gonflés, une partie des moyens à rotation se maintient au-dessus d'une surface de support (5) et rend mobile toute charge portée alors que, lorsque les moyens (4) sont dégonflés, les moyens à rotation (4) sont rétractés de sorte que la charge est immobile sur la surface de support, des moyens d'entraînement (14) venant en contact avec une charge et la déplaçant le long du convoyeur (2) lorsqu'une partie des moyens à rotation (4) fait saillie au-dessus de la surface de support (5), des moyens de commande (19, 20) pour entraîner les moyens d'entraînement, et un dispositif de montage de moyens d'entraînement pour lever et abaisser ceux-ci par rapport à la surface de support, caractérisé en ce que les moyens d'entraînement (14) sont montés le long du convoyeur allongé (2, 2', 2''), et en ce que les moyens d'entraînement (14) présentent une surface qui peut "glisser" en contact avec une charge immobile de sorte que les moyens de commande (19, 20) continuent à actionner les moyens d'entraînement (14).

2. Appareil de manipulation mécanique selon la revendication 1, caractérisé en ce qu'est prévue une console de montage à pivot (15) reliée à un dispositif de commande actionné par fluide (16, 17) et aux moyens d'entraînement (14) pour lever et abaisser les moyens d'entraînement (14).

3. Appareil de manipulation mécanique selon une revendication précédente quelconque, caractérisé par un organe de transmission (19) et un moteur hydraulique (20) comprenant les moyens de commande pour entraîner les moyens d'entraînement (14).

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